

FRASNIAN GASTROPODS FROM THE BONAPARTE GULF BASIN,  
WESTERN AUSTRALIA

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Eight taxa of gastropods are described from the Late Devonian (Frasnian) Westwood Member of the Hargreaves Formation, Bonaparte Gulf Basin, Western Australia. Of these *Ningbingia robertsi* gen. et sp. nov., *Aglaoglypta veeversi* sp. nov., *Pseudomphalotrochus bonapartensis* sp. nov., *Westwooditrochus weestwoodensis* gen. et sp. nov., and *Plagiothrya curlyjigga* sp. nov. are new. The remaining taxa are left in open nomenclature. *Pseudomphalotrochus*, *Aglaoglypta* and *Plagiothrya* relate strongly to European and/or North American Devonian taxa. □ *Devonian, Frasnian, gastropods, Western Australia.*

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The Westwood Member of the Hargreaves Formation is an abundantly fossiliferous unit which crops out near Westwood Ck, in the vicinity of Cape Dommet, Bonaparte Gulf Basin, WA. The member contains a diverse assemblage of algae, corals, stromatoporoids, brachiopods, conodonts, fish plates, bivalves and gastropods, of which, only the brachiopods (Roberts, 1971) and conodonts (Druce, 1969) have received taxonomic attention.

The most recent stratigraphic and sedimentologic summaries of the Hargreaves Formation are given by Mory & Beere (1988) and Mory (1990) who both indicated reefal and back-reefal depositional environments for this unit. The age of the Westwood Member was given as Frasnian by Druce (1969) and Roberts (1971) and subsequent studies (Mory & Beere, 1988; Mory, 1990) have confirmed this age. This paper describes the modest gastropod faunule from the Westwood Member. All gastropods described in this work come from outcrops on, or adjacent to, tidal flats near Westwood Ck. These are:

QML1035 – Westwood Ck, Cape Dommet, tidal flats, 14°51.7' S, 128°30.1' E. Medusa Banks 1:250000 Geological Sheet SD 52-10. Collected Jell & Cook, 1996.

QML1037 – 400m to NE of QML1035, amongst pinnacles of reefal limestone and oncolitic beds. Collected Jell & Cook, 1996.

Phylum MOLLUSCA  
Class GASTROPODA

Order ARCHAEOGASTROPODA Theile, 1925  
Suborder BELLEROPHONTINA Ulrich & Scofield, 1897

Superfamily BELLEROPHONTOIDEA  
M'Coy, 1851

Family BELLEROPHONTIDAE M'Coy, 1851  
Subfamily TROPIDODISCINAE Knight, 1956

*Ningbingia* gen. nov.

ETYMOLOGY. For 'Ningbing' Station, upon which the material was collected.

TYPE SPECIES. *Ningbingia robertsi* sp. nov.

DIAGNOSIS. Large members of subfamily, with narrow, rapidly expanding shell, with wide umbilicus, and an ornament consisting of strongly arcuate ribs.

REMARKS. The narrow crested selenizone, the arcuate ribbing and the shell form identifies the material as belonging to the Tropidodiscinae. It is most similar to *Tropidodiscus*, but is distinguished by its large size and the more arcuate ornament on the whorl face, particularly near the umbilicus. The type species of *Tropidodiscus*, *Bellerophon curvilineatus* Conrad, from the Onondaga Limestone of New York is a moderately large member of the genus (and subfamily). The genotype has a diameter of approximately 28mm (Knight, 1941), contrasting strongly with the tiny species known from Early and Middle Devonian faunas in eastern Australia. For example *T. centrifugalis* (Chapman) of Tassell (1982) from the *Receptaculites* Limestone (Emsian) of New South Wales is close to one third of this size. A small tropidodiscine from the Burdekin Formation (Givetian) of Queensland is only 2.5mm in diameter (Cook, 1997). *Ningbingia* is up to 52mm in diameter, and is proportionately thicker than the genotype, it also possesses strong, arcuate

TABLE 1. Shell measurements for *Ningbingia robersti* gen. et sp. nov.

Specimen	Diameter (mm)	Width (mm)
QMF35010	18.1	9.5
QMF35059	38.5	17.6
QMF35061	26.5	14.5
QMF35072	52.1	25.5
QMF35118	32.0	18.5
QMF35121	26.0	10.5

ornament in contrast to the fine growth lines of *Tropidodiscus curvilineatus* (Conrad).

***Ningbingia robertsi* sp. nov.**  
(Fig. 1A-E)

ETYMOLOGY. For Professor John Roberts.

MATERIAL. Holotype: QMF35059. Paratypes: QMF35054-35058, 35060-35066, 35069, 35071-35074, 35088-35090, 35116-35118, 35121, 35010 all from QML1035.

DIAGNOSIS. As for genus.

DESCRIPTION. Shell medium sized to large, sharply narrow, involute, rapidly expanding shell, up to 38.5mm in diameter and 25.5mm wide (Table 1). Umbilicus up to 1/3 of shell diameter. Selenizone on a crest, narrow, flanked by two weak cords. Ornament consists of strong arcuate ribs curving strongly into the umbilicus, and on the last whorl becomes more arcuate towards the aperture.

Family BELLEROPHONTIDAE M'Coy, 1851

***Aglaoglypta* Knight, 1942**

REMARKS. *Aglaoglypta* Knight 1942 was erected upon *Bellerophon koeneni* Clarke, from the Late Devonian (Frasnian) "Naples" Fauna of New York. Knight (1942) did not provide a list of species included in his concept of the genus, and subsequently little attention has been paid to the taxon. Despite the suggestion (Knight, 1942) and the assertion (Knight et al., 1960) that *Aglaoglypta* represents a subgenus, it is retained here at generic status due to the highly diagnostic pustulate ornament. Species here placed in *Aglaoglypta* are, apart from the type; *Bellerophon tuberculatus* Ferrusac & d'Orbigny of d'Archaic & de Verneuil (1842), *B. maera* Hall, from the Chemung of New York and *B. neleus* Hall & Whitfield (1877) from the Devonian of Nevada. Clarke (1903) listed *B. striatus* Ferrusac & d'Orbigny, *B. tuberculatus* d'Orbigny (a differing authorship attributed than by d'Archaic & de Verneuil) and *B. alutaceus* d'Orbigny as those Devonian *Bel-*

TABLE 2. Shell measurements for *Aglaoglypta veeversi* sp. nov.

Specimen	Diameter (mm)	Width (mm)
QMF35539	13.5	14.0
QMF35016	14.5	17.6
QMF35540	14.5	15.5
QMF35540	13.4	12.7
QMF35568	15.0	14.3

*lerophon* species with pustulose ornament. I have been unable to access original descriptions of *B. alutaceus*, *B. striatus*, or *B. tuberculatus*, so my assessment of the genus is incomplete. The genus requires a review, by an author with access to the early 19th century literature and the European material.

***Aglaoglypta veeversi* sp. nov.**  
(Fig. 1F-J)

ETYMOLOGY. For Professor J.J. Veevers.

MATERIAL. Holotype: QMF35539. Paratypes: QMF35016, 35540-35560 all from QML1035.

DIAGNOSIS. Ornament subdued, pustulate, arranged along fine growth lines.

DESCRIPTION. Small, spheroidal, involute shell, with very narrow umbilicus. Up to 17.5mm diameter, 15.5mm in width (Table 2). Ornament of fine growth lines with papillae arranged in rows upon them. Weak, low crest bearing selenizone. Aperture moderately flared where preserved.

REMARKS. The species differs from the type in having weaker pustules which occupy less space on the whorl surface. *Aglaoglypta tuberculatus* (Ferussac & d'Orbigny) of d'Archaic & de Verneuil from the Devonian (Eifel) of Paffrath has similar arrangement and strength of the pustules (based on the figure and limited description). *A. maera* (Hall) also has stronger ornament, and a slightly more recurved lip than the Bonaparte species.

Suborder MACLURITINA Cox & Knight, 1960  
Superfamily EUOMPHALOIDEA  
de Koninck, 1881

Family EUOMPHALIDAE de Koninck, 1881

***Pseudomphalotrochus* Blodgett, 1992**  
***Pseudomphalotrochus bonapartensis* sp. nov.**  
(Fig. 2)

ETYMOLOGY. From the Bonaparte Gulf Basin.

MATERIAL. Holotype: QMF35087. Paratypes: QMF35067, 35068, 35070, 35075, 35076, 35079-

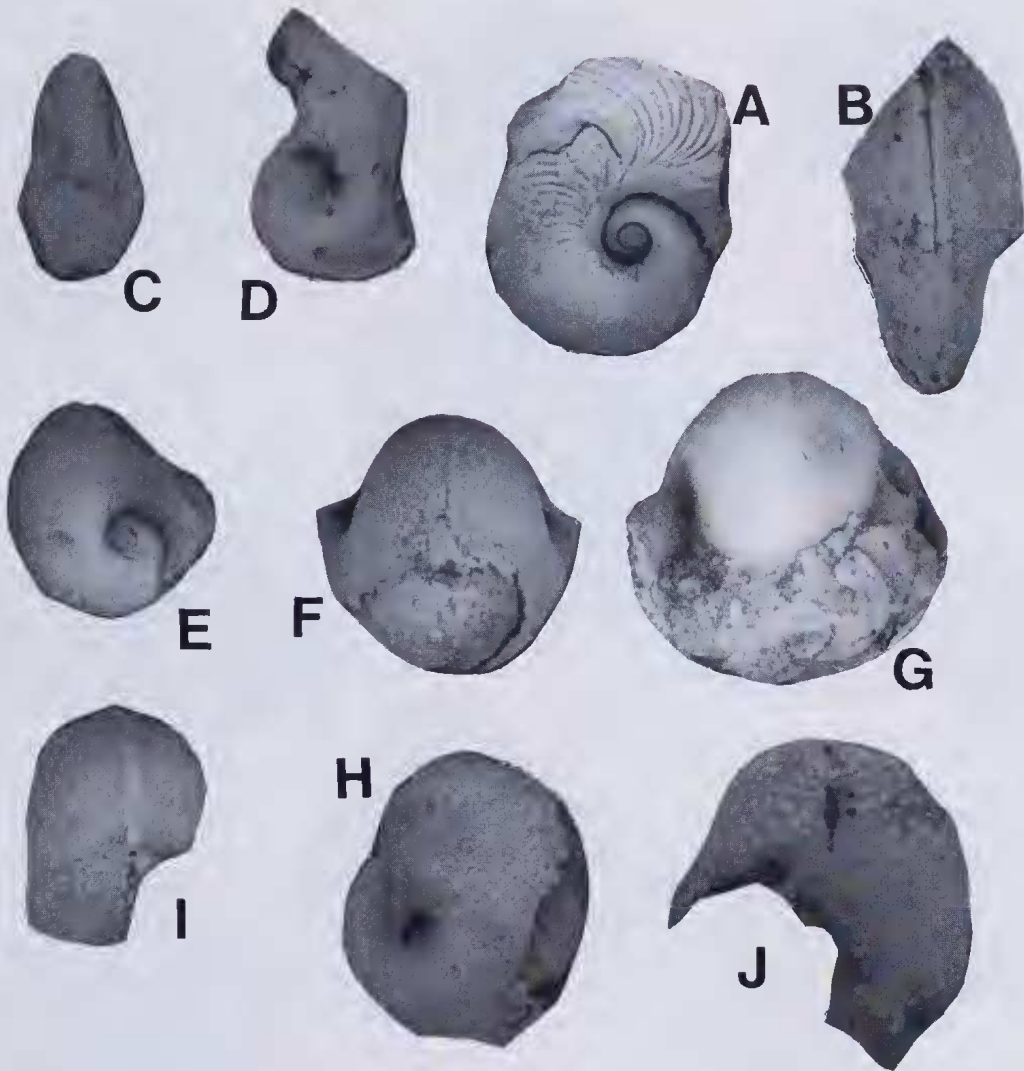


FIG. 1. A-E. *Ningbingia robertsi* gen. et. sp. nov. A, B, Holotype QMF35059. A, x1, B, x1.5. C, D, Paratype QMF35010 x 2. E, Paratype QMF35061 x 1. F-J, *Aglaoglypta veeversi* sp. nov. F, G, H Holotype QMF35539, x 2.5. I, Paratype QMF35540 x 2. J, Paratype QMF35541 x 2.5.

35085, 35094-35098, 35100-35104, 35107, 35109-35115, 35120, 35122-35127 all from QML1035.

**DIAGNOSIS.** Medium sized, turbiniform, medium to high-spired, phaneromphalous with circumbilical nodose cord.

**DESCRIPTION.** Shell medium-sized to large, turbiniform, phaneromphalous, with a variable spire height (Table 3). Sutures impressed, whorls embrace below mid-whorl. In early whorls the whorl profile is rounded, however, in later whorls the whorl profile consists of a sub rounded, shallow sloping subsutural surface bordered abapically by a weak angulation, near vertical slightly

rounded midwhorl, similarly bounded, and a rounded lower whorl profile giving way to an umbilicate base. The umbilicus occupies up to 1/3 of the base and a circumbilical nodose cord is present. Surface of the shell has adhered skeletal fragments on midwhorl, on the angulation on the upper mid whorl or has shallow pits on the mid whorl face. Growth lines are fine, numerous and nearly orthocline. Aperture is quadrate, wider than high with a slight parietal invagination. Early whorls are septate, with a few closely spaced septa in a few specimens. Generally the early whorls are missing.

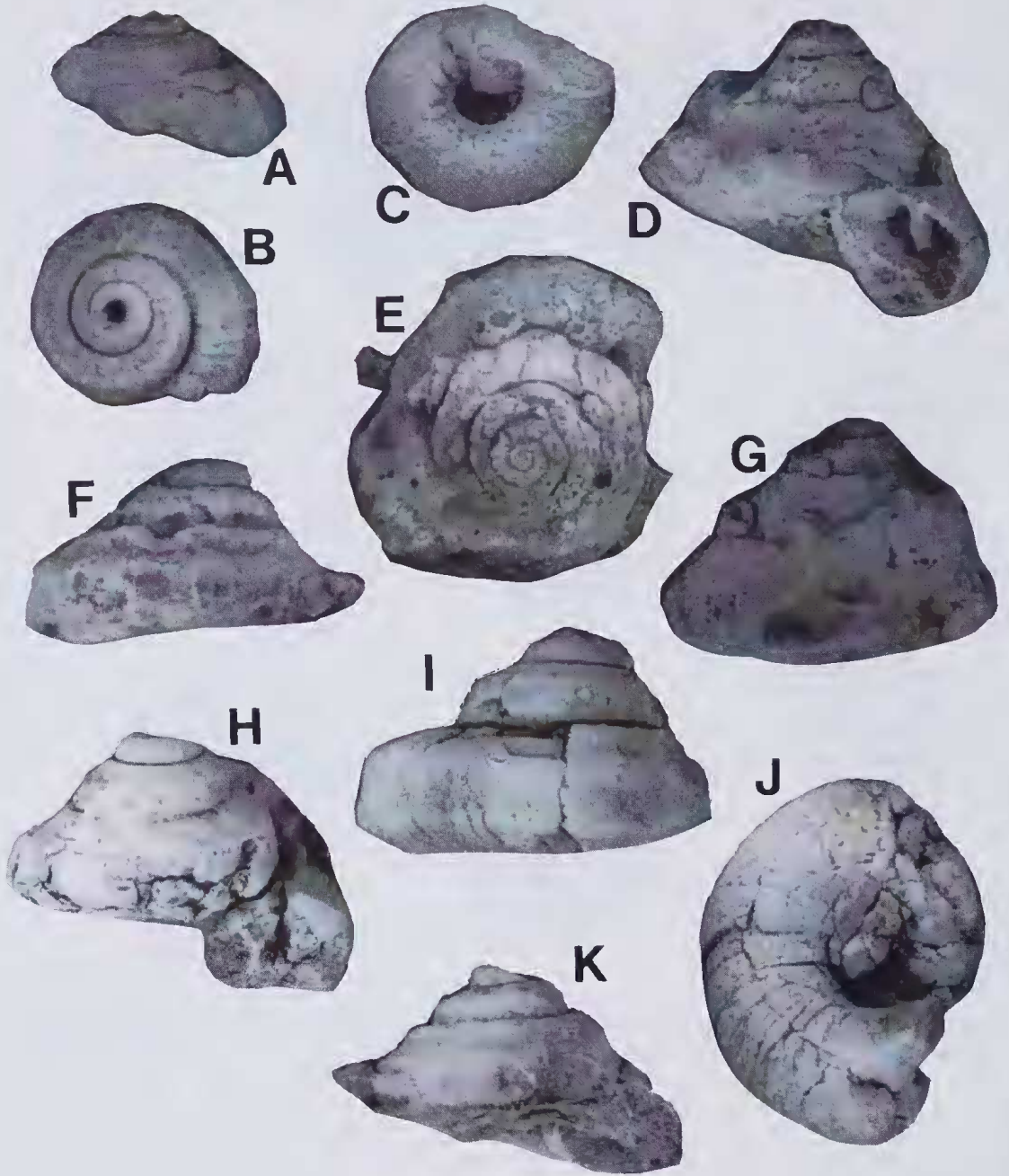


FIG. 2 *Pseudomphalotrochus bonapartensis* sp. nov. A-C, Holotype QMF35087 x1.5. D-G, Paratype QMF35104, x1.8. H-I, Paratype QMF35075 x 1.8. K, Paratype QMF35102 x 1.8.

REMARKS. Blodgett (1992) erected this genus for large gradate omphalotrochids with a circumbilical ridge on the basal angulation. The type species *P. linsleyi* Blodgett, 1992 from the Eifelian of Alaska has a more prominent angulation

on the base, but shares the circumbilical cord. The Bonaparte species is most closely allied with *P. hoffmanni* (Linsley & Yochelson, 1973, from the late Eifelian Rogers City Limestone, Michigan). They share similar whorl profiles, and both have

TABLE 3. Shell measurements for *Pseudomphalotrochus bonapartensis* sp. nov.

Specimen	Height (mm)	Width (mm)
QMF35087	15.0	21.2
QMF35103	19.5	23.0
QMF35081	20.9	22.5
QMF35100	23.6	28.7
QMF35104	17.8	23.0
QMF35125	22.3	27.5

a circumbilical cord, although *P. hoffmanni* lacks nodes on that cord. Also included in *Pseudomphalotrochus* by Blodgett (1992) was *Cirrus leonhardi* D'Archaic & DeVerneuil, 1842, which has a nodose upper whorl angulation. It is impossible to discuss this taxon without reference to closely related species of euomphalids. Linsley & Yochelson (1973) reviewed a number of *Straparollus* taxa including *S. (S.) hoffmanni*, assigned to *Pseudomphalotrochus* by Blodgett (1992), with material adhered to the shell, collectively referring to them as the 'Devonian carrier shells'. Importantly they remarked on the variability in relative spire height in both *S. (Straparollus)* and *S. (Euomphalus)*. The variation in whorl profile present in *P. bonapartensis* is also recorded in *S. (?E.) incrustatus* Linsley & Yochelson, from the Middle Devonian of Utah. It could be argued that this species should be placed in *Micromphalus* Knight, 1945, given the high spire and the angular faces on the whorl profile. However the W.A. specimens have the upper whorl profule sinus, and a wide rather than a narrow umbilicus, a narrow umbilicus being diagnostic for *Micromphalus*. The presence of this genus in faunas of this age is not unexpected and highlights affinities to faunas in North America and Europe.

## Suborder INDET.

Superfamily PALAEOTROCHOIDEA Knight, 1956

Family PALAEOTROCHIDAE Knight, 1956

**Westwooditrochus** gen. novETYMOLOGY. For Westwood Ck, the type locality, and *trochus* referring to the trochiform shell.TYPE SPECIES. *Westwooditrochus westwoodensis* sp. nov.

DIAGNOSIS. Medium sized, squatly turbiniform, with flattened base, cryptomphalus with callus pad, nodose cord just below suture, another on angulation at whorl periphery situated well below mid-whorl; growth lines opisthoclinal on upper whorl face.

REMARKS. The lower cord and angulation, combined with the unusual orientation of the growth lines define placement within the family, but the material cannot be accommodated in *Palaeotrochus* Hall, 1879 which lacks the upper cord or *Turbinopsis* Grabau & Shimer, 1909 which not only lacks the upper cord but possesses strong ridges on the upper whorl face. The base of the Bonaparte species is more flattened than other members of the family and possesses an umbilical plug.

**Westwooditrochus westwoodensis** sp. nov.

(Fig. 3A-F)

ETYMOLOGY. For Westwood Ck, the type locality.

MATERIAL. Holotype: QMF35014. Paratypes: QMF35009, 35011 all from QML1037.

DIAGNOSIS. As for genus.

DESCRIPTION. Shell thick, medium sized, rapidly expanding, squatly turbiniform. Sutures impressed; whorls embrace at periphery which is well below the mid-whorl. Whorl profile angular, with nodose carina at periphery. Upper whorl surface is about 2/3 of the profile, steep (approx. 45°); adjacent to the suture it bears a spiral row of nodes. Below the periphery the lower whorl profile is an inclined surface itself bounded abapically by a weaker nodose spiral cord. Base flattened with an additional, weaker cord near the outer margin. An umbilical pulg occupies more than half of the base. Growth lines are fine and numerous, gently curved and opisthoclinal on the upper whorl surface, with a slight sinus, nearly straight across the peripheral angulation and strongly prosoclinal on the base.

Suborder NERITOPSINA Cox & Knight, 1960  
Superfamily NERITOIDEA Rafinesque, 1815**Plagiothyra** Whidborne, 1892TYPE SPECIES. *Monodonta purpurea* d'Archaic & de Verneuil, 1842 from the Middle Devonian of Paffrath, Germany.**Plagiothyra curlyjigga** sp. nov.

(Fig. 4A-G)

ETYMOLOGY. From the vernacular of P.A. Jell for fossil snail; 'curly-jigger'.

MATERIAL. Holotype: QMF35045. Paratypes: QMF35046-35052, 35105, 35106, 35108, 35119, all from QML1035.

DIAGNOSIS. Large member of genus with elongated nodes on the strong spiral ornament.

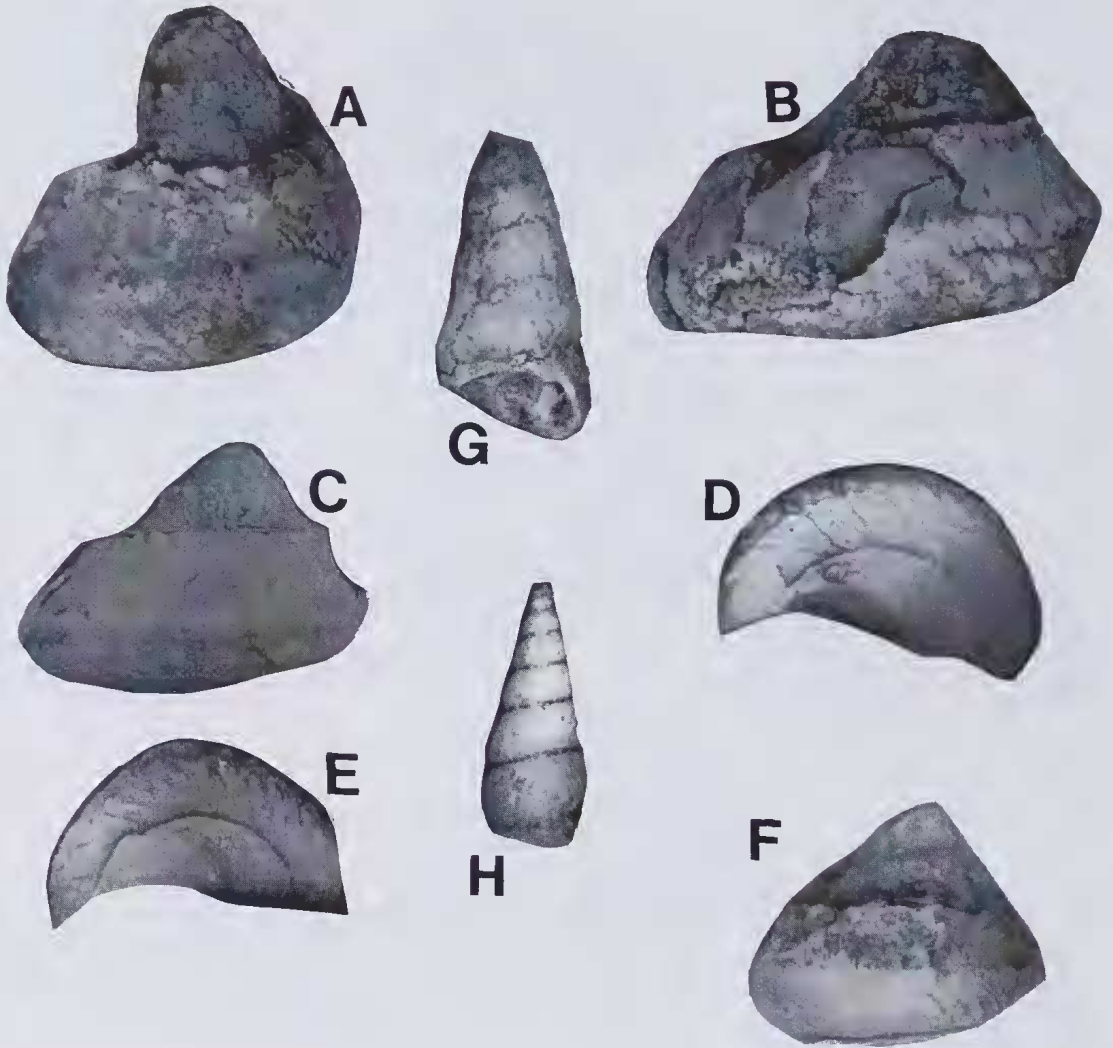


FIG. 3. A-F, *Westwooditrochus bonapartensis* gen. et sp. nov. A, B, Paratype QMF35009 x 1.5. C, D, Holotype QMF35014 x 1.5. E, F, Paratype QMF35011 x 1.5. G, H, Murchisoniidae gen. et sp. indet.; G, QMF35078 x 1.5; H, QMF35093 x 1.5.

**DESCRIPTION.** High-spired, dextral, turbiniform, thick-shelled and anomphalous. Sutures moderately impressed, whorls embrace just below periphery situated slightly below mid-whorl. Whorl profile rounded with widened mid-whorl area. Whorl face adorned by up to 13 nodose spiral cords. On the holotype the cords are sporadically interrupted such that they possess elongated nodes, presenting a dashed-line appearance. On other specimens the nodes are more rounded. Aperture rounded with invagination near the suture. The holotype possesses a small fold on the upper part of the parietal lip as it approaches the suture. Proto-

conch present on the holotype is simple, smooth and dextral.

**REMARKS.** The single parietal fold, combined with the strong spiral, nodose ornament places the material in Plagiothyridae Knight, 1956. It is most similar to *Plagiothyra* Whidborne, 1892 and is placed there given the singular parietal fold. The type species *Monodonta purpurea* d'Archaic & de Verneuil, 1842, from the Middle Devonian of Paffrath, Germany is only 22mm high, in stark contrast to the Bonaparte species, and the genus lacks the strongly elongated aspect to nodes on the spiral cords. *Dirachis atavus* of Whidborne

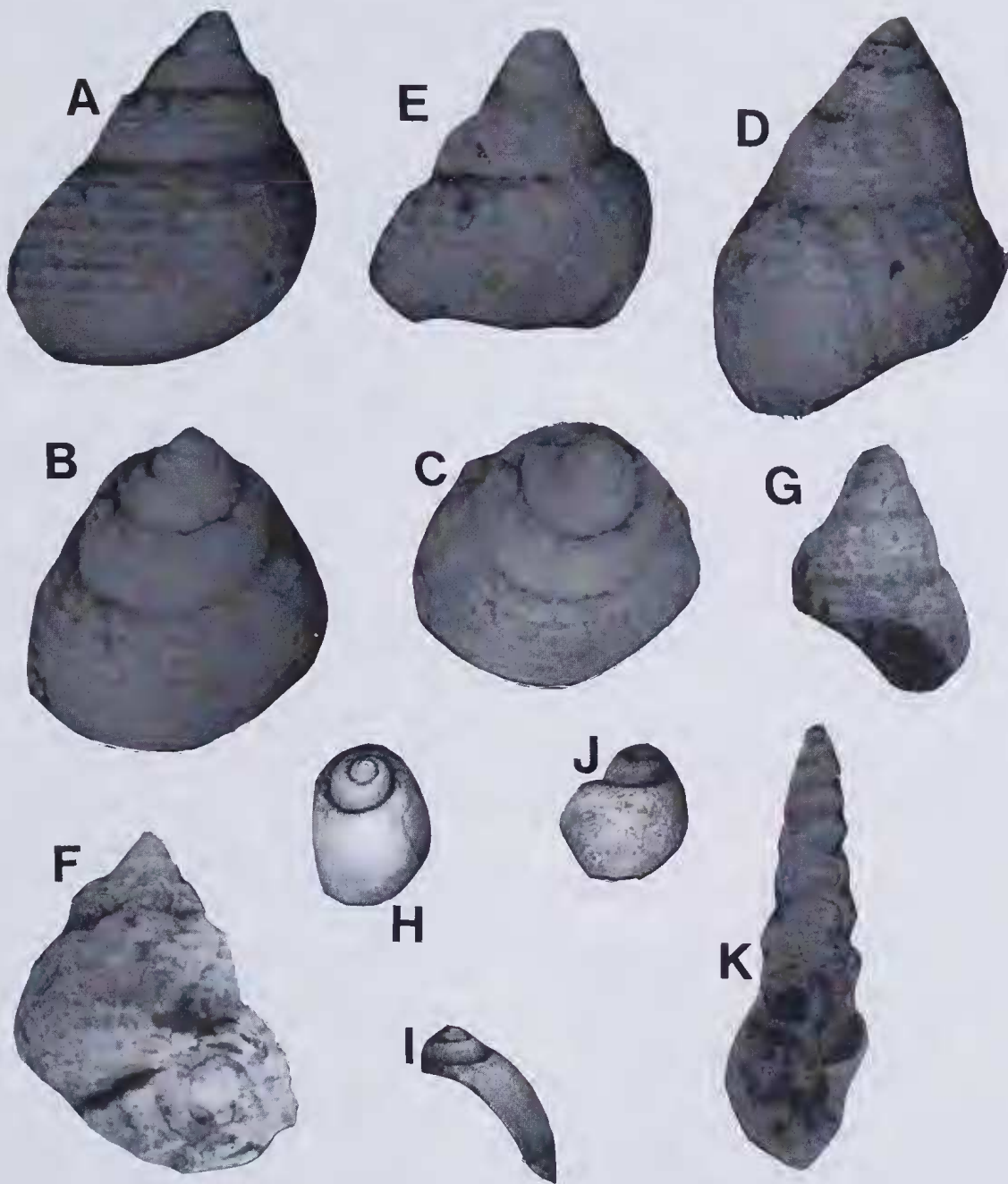


FIG. 4. A-G, *Plagiothyra curlyjigga* sp. nov. A-C, Holotype QMF35045 x 2. D, Paratype QMF35046 x 2. E-F, Paratype QMF35047 x 2. G, Paratype QMF35051 x 2. H-J, *Naticopsis (Naticopsis)* sp. H, I, QMF35013 x 1. J, QMF35109 x 1. K, *Murchisonia (Murchisonia)* sp. QMF35015 x 1.5.

(1892), from the Middle Devonian of Chudleigh is only 13mm high, has similarly elongated nodes on the spiral cords, but possesses two folds on the

inner lip. The species is clearly closely related to both *Dirachis* and *Plagiothyra*.

TABLE 4. Shell measurements for *Murchisoniidae* gen. et sp. indet.

Specimen	Height (mm)	Width (mm)
QMF35077	22.7	13.5
QMF35078	25	12
QMF35092	14.9	9.5
QMF35093	20	10

Family NERITOPSIDAE Gray, 1847  
Subfamily NATICOPSINAE Miller

*Naticopsis* M'Coy, 1844  
*Naticopsis* (*Naticopsis*) M'Coy, 1844  
*Naticopsis* (*Naticopsis*) sp.  
(Fig. 4H-J)

MATERIAL. QMF35109, 35538 from QML 1037, QMF35013 from QML1035.

DESCRIPTION. Small to medium sized, naticiform, rapidly expanding shell, maximum height 22mm, maximum width 17mm. Suture strongly impressed, channelled in largest specimen (QMF35013). Whorls embrace high on whorl face. Whorl profile rounded with midwhorl slightly below periphery. Aperture ovate with vertical axis longer. Growth lines very fine, slightly prosocline.

REMARKS. Poor preservation, and the small number of specimens, renders specific diagnosis impossible. The material possesses the characteristic globular form and growth lines of the subgenus.

Suborder MURCHISONIINA Cox & Knight,  
1960

Family MURCHISONIIDAE Koken, 1896

*Murchisonia* d'Archaic & de Verneuil, 1841  
*Murchisonia* (*Murchisonia*)  
d'Archaic & de Verneuil, 1841  
*Murchisonia* (*Murchisonia*) sp.  
(Fig. 4K)

MATERIAL. QMF35015 from QML1037.

DESCRIPTION. A very high-spined, narrow, and multi-whorled shell which is partially weathered from limestone. It is 40.7mm high, with a basal width of 13.6mm. At least 9 whorls present but the apex is obscured. Suture impressed and whorls embrace well below mid whorl. Whorl profile angular with mid-whorl peripheral angulation bearing a selenizone flanked by two cord. A very weak spiral thread is present on the lower whorl surface.

REMARKS. I am unable to nominate a species based on the single poorly preserved specimen.

*Murchisoniidae* gen. et sp. indet.  
(Fig. 3G, H)

MATERIAL. QMF35077, 35078, 35091-93.

DESCRIPTION. Medium-sized, anomphalus, high spired, up to 25mm high and 13.5mm wide (Table 4). Suture weakly impressed. Whorl profile flattened to very weakly rounded. Weak spiral thread present on the lowermost whorl face, just above the suture.

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